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## (54) SELF-TAPPING SCREW

(71) We, ALTENLOH, BRINCK & Co., of 77, Kölner Strasse, 5828 Ennepetal-Milspe, Federal Republic of Germany, a Kommanditgesellschaft organised under the laws of the Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a self-tapping screw provided with a head and a single or multi-start thread extending over at least a portion of its shank.

According to the present invention, there is provided a self-tapping screw provided with a head and a single or multi-start thread extending over at least a portion of its shank, the thread being provided with a sinuous outer edge and having a symmetrical profile, which is of substantially triangular shape and which includes an angle substantially equal to  $40^\circ$  at the outer edge, and the axis of symmetry of the profile being inclined toward the head through an angle of at least  $5^\circ$  from the perpendicular to the longitudinal axis of the screw.

Advantageously, the core diameter of the shank is substantially equal to 0.6 times the normal diameter of the screw.

Expediently, the self-tapping screw may be hardened and may further be provided with an abrasion resistant, friction reducing coating.

An embodiment of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, wherein:—

Fig. 1 illustrates in side elevation a self-tapping screw embodying the invention;

Fig. 2 shows to an enlarged scale a portion of the self-tapping screw illustrated by Fig. 1;

Fig. 3 shows a section on the line III—III in Fig. 2; and

Fig. 4 shows a detail portion to an enlarged scale of the screw indicated at A in Fig. 1.

Referring now to the drawings, the self-tapping screw there illustrated has a shank 5 and a head 51, which here for example is shown as a countersunk head, but which may of course be of any suitable shape and which may be provided with a slot or recess for engagement by a screw driver.

The shank 5 has a cylindrical shape and a tip 52, which may be pointed in the manner of a bradawl or in itself form a drill tip. The helical thread 6, which may be that of a single start or of a multi-start thread, has a radial outer edge 61, which in accordance with the invention is formed as a sinuous cutting edge, as shown particularly in Fig. 3. The profile of the thread is substantially triangular and includes an angle substantially equal to  $40^\circ$  at the outer edge.

As shown in Fig. 4, the bisector of the angle of the profile, that is to say the axis of symmetry of the profile is inclined toward the head through an angle of  $X^\circ$ . In the preferred embodiment, the axis of symmetry 7 of the profile of the thread 6 deviates by an angle  $X$  of at least  $5^\circ$  from the perpendicular 8 to the longitudinal axis 9 of the screw.

To improve the load capacity of the self tapping screw of the preferred embodiment, the height  $H$  of the thread is chosen to be relatively great. This is achieved thereby, that the core diameter  $d_K$  (Fig. 2) is chosen to be only about 60% of the nominal diameter  $d_N$  (Fig. 1).

By suitable dimensioning and choice of manufacturing methods, including hardening and/or coating the screw with a material, which is inherently either abrasion resistant or friction reducing or both, the screw embodying the present invention can offer one or more of several advantages. Thus, thread cutting characteristics better than those of conventionally manufactured screws can be achieved by the sinuous shape of the cutting edge of the thread and by the relatively pointed profile, which lead to a reduction in the frictional forces and, in turn, to a reduction in the torque required to drive the screw

home. The asymmetrical arrangement or shaping of the profile of the thread increases the tear-out strength or load capacity of the screw. An advantage of the reduced core diameter is the consequently reduced displacement of the material, into which the screw is inserted. This is particularly significant when self-tapping screws are used in laminar or laminated materials and substantially reduces the risk of the layers of the material being forced apart or caused to crumble or be subjected to undue shear forces.

15 WHAT WE CLAIM IS:—

20 1. A self-tapping screw provided with a head and a single or multi-start thread extending over at least a portion of its shank, the thread being provided with a sinuous outer edge and having a symmetrical profile, which is of substantially triangular shape and which includes an angle substantially equal to  $40^\circ$  at the outer edge, and

the axis of symmetry of the profile being inclined toward the head through an angle of at least  $5^\circ$  from the perpendicular to the longitudinal axis of the screw. 25

2. A self-tapping screw as claimed in claim 1, wherein the core diameter of the shank is substantially equal to 0.6 times the nominal diameter of the screw. 30

3. A self-tapping screw as claimed in either claim 1 or claim 2 and hardened.

4. A self-tapping screw as claimed in any one of the preceding claims and provided with an abrasion resistant, friction reducing coating. 35

5. A self-tapping screw substantially as hereinbefore described and as shown in the accompanying drawings. 40

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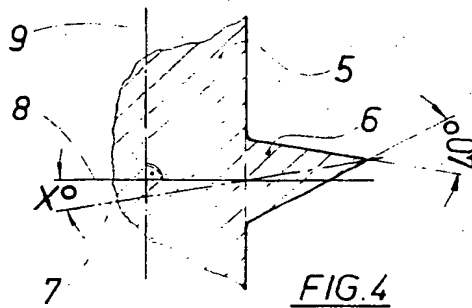
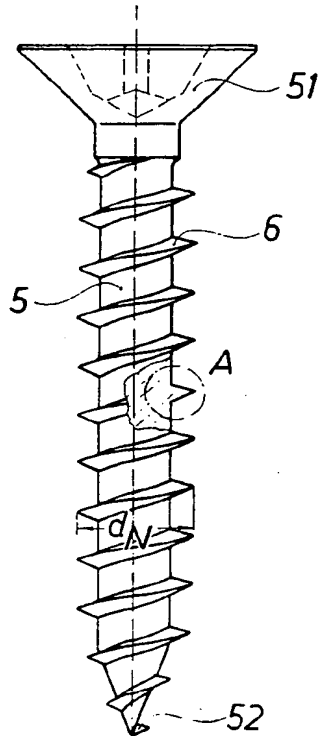
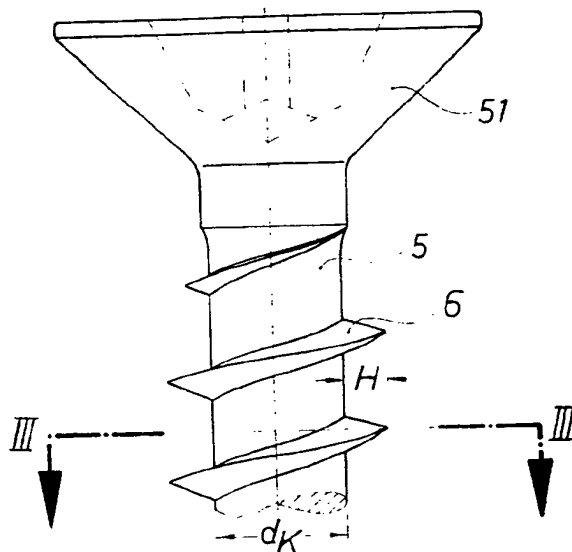
FIG. 1

FIG. 2FIG. 3